

## CLAIMS

1. A semiconductor device comprising:

an insulation film formed on a substrate;

a buried interconnect formed in the insulation film; and

5 a barrier metal film formed between the insulation film and the buried interconnect,

wherein the barrier metal film is formed of a lamination film of a metal compound film and a metal film which does not lose its conductivity when being oxidized, and

wherein a fusion layer obtained through fusion of the metal compound film and the metal film with each other is present in the vicinity of an interface between the metal  
10 compound film and the metal film.

2. The semiconductor device of claim 1, wherein a metal forming the metal compound film and a metal forming the metal film are different elements from each other.

15 3. The semiconductor device of claim 1, wherein a metal forming the metal compound film and a metal forming the metal film are the same element.

4. The semiconductor device of claim 1, wherein the fusion layer includes at least several atomic layers.

20 5. The semiconductor device of claim 1, wherein the metal compound film is formed so as to be jointed with the insulation film, and  
wherein the metal film is formed on the metal compound film.

25 6. The semiconductor device of claim 1, wherein a metal forming the metal

compound film is a refractory metal.

7. The semiconductor device of claim 1, wherein the metal compound film has conductivity.

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8. The semiconductor device of claim 1, wherein the metal compound film is formed of a metal oxide film.

9. The semiconductor device of claim 1, wherein the metal compound film is  
10 formed of a metal nitride film.

10. The semiconductor device of claim 1, wherein the metal compound film is formed of a metal carbide film.

15 11. The semiconductor device of claim 1, wherein the metal compound film is formed of a metal silicide film.

12. The semiconductor device of claim 1, wherein the buried interconnect is formed of copper or a copper alloy.

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13. A method for fabricating a semiconductor device, comprising the steps of:  
forming a recess portion in an insulation film provided on a substrate;  
forming a barrier metal film so that the barrier metal film covers surfaces of the recess portion; and

25 forming a buried interconnect on the barrier metal film so that the recess portion is

filled,

wherein the step of forming a barrier metal film includes the step of forming a metal compound film so that the metal compound film covers surfaces of the recess portion and then forming on the metal compound film by physical vapor deposition a metal film  
5 which does not lose its conductivity when being oxidized.

14. The method of claim 13, further comprising, between the step of forming a barrier metal film and the step of forming a buried interconnect, the step of forming a seed layer on the barrier metal film, and

10 wherein in the step of forming a buried interconnect, the buried interconnect is formed on the seed layer so that the buried interconnect fills the recess portion.

15 15. The method of claim 13, wherein a metal forming the metal compound film and a metal forming the metal film are different elements from each other.

16. The method of claim 13, wherein a metal forming the metal compound film and a metal forming the metal film are the same element.

20 17. The method of claim 13, wherein a fusion layer obtained through fusion of the metal compound film and the metal film with each other is formed in the vicinity of an interface between the metal compound film and the metal film, and

wherein the fusion layer includes at least several atomic layers.

25 18. The method of claim 13, wherein a metal forming the metal compound film is a refractory metal.

19. The method of claim 13, wherein the metal compound film has conductivity.

20. The method of claim 13, wherein the metal compound film is formed of a metal  
5 oxide film.

21. The method of claim 13, wherein the metal compound film is formed of a metal  
nitride film.

10 22. The method of claim 13, wherein the metal compound film is formed of a metal  
carbide film.

23. The method of claim 13, wherein the metal compound film is formed of a metal  
silicide film.

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24. The method of claim 13, wherein the buried interconnect is formed of copper or  
a copper alloy.